

IN MEMORIAM

MASAYA SATO: RESEARCH AND A LIFE

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Dr. Masaya Sato pioneered behavior analysis research in Japan and was the long-term leader of the Japanese Association for Behavior Analysis. He also made major contributions in disseminating behavior analysis around the world as the first president of the Association for Behavior Analysis International from outside the United States. Masaya Sato's life was ended prematurely and tragically by a terrible accident on the night of August 23, 2010. As he was waiting at a station platform for a train

he was pushed forward from behind and died after falling between the train and the platform.

Masaya Sato was born October 27, 1932, in Tokyo, Japan. His father was the renowned poet and novelist, Haruo Sato. His mother was also well-known. In her first marriage, her husband was Jun-ichiro Tanizaki, as great a legend in literature as Haruo Sato. Discussions among Mr. and Mrs. Tanizaki and Mr. Sato led to a decision for Mrs. Tanizaki to take Mr. Sato as a new husband in 1930. This decision was announced in newspapers, and has been memorialized as a remarkable affair in the history of Japanese literature. The young Masaya Sato was raised in an elegant European-style residence in Tokyo designed by his

Address correspondence to Koichi Ono (e-mail: ono@komazawa-u.ac.jp). As for the other activities of Masaya Sato, see Ono (2011). Photo by Bill Heward, May 2006 at the 32nd annual convention of the Association for Behavior Analysis International.
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father, except for a brief period when he moved to a rural area to get away from the destructive air raids during World War II. Dr. Sato lived in the same residence during his life with his wife, Naoko Sugiyama.

In 1953, Dr. Sato entered the Psychology Department of Keio University in Tokyo, where he received a B. A. and M. A. degree in psychology. He finished his doctoral program in 1962, but received the Ph.D. from Keio University in 1976; the Japanese tradition in those days was to award a Ph.D. for a lifetime of contributions—a situation now changed. He began work as an assistant in Keio University, and then, through 1998, he engaged in research and education in Keio University advancing from lecturer to the rank of professor. His dissertation, entitled “Issues on stimulus control in operant conditioning,” represented his lifelong interest in the experimental analysis of behavior and in behavior analysis in general.

During his lifetime, he wrote many books, chapters, and articles, mostly written in Japanese although they referred to many important articles in English. His writings explored various areas of behavior analysis within both experimental and conceptual analyses of behavior, including such topics as imprinting, sympathy and imitation, behavior and awareness, verbal conditioning, memory, observational learning, quarreling, lying, and laughing.

For example, in 1975, Dr. Sato wrote an epoch-making article for the journal, *Japanese Psychological Review*, entitled “A historical survey of the experimental analysis of behavior.” This paper chronologically surveyed the development of the experimental analysis of behavior, and proposed ideas about how we should confront future problems of behavior analysts. In 1976, Dr. Sato published the book “Invitation to Behavioral Theories,” which became a longtime best seller in psychology in Japan. The book consists of fifteen chapters; and, as befits the title, the early chapters describe the basic concepts of different behavioral theories, but the later ones describe the key concepts of behavior analysis. In particular, three chapters include virtual dialogues with Skinner about such concepts as the operant, humans and their environment, and consciousness and verbal behavior. I read this book as if it were a presentation by Skinner himself. Through his books, chapters, and

papers, many Japanese students in their courses learned behavior analysis and many Japanese researchers in psychology came to understand and appreciate behavior analysis.

Reviewing Dr. Sato’s academic work now *in toto*, I would state that the most valuable research is surely that on stimulus control, followed by his work on verbal behavior. He started his research on stimulus generalization under the supervision of Professor Takashi Ogawa when he was an undergraduate student, and expanded the research as he moved through his graduate master and doctoral programs. As I will elaborate later, he conceived of stimulus control and verbal behavior as similar events which can be treated by the same framework. We can guess his special concern with verbal behavior from the fact that he translated (in collaboration with students) two books on language; one was Lenneberg (1967), and the other MacNeill (1970). He also wrote many articles for journals that published research in language and linguistics.

To survey his thinking and aims in his research on stimulus control I’ll now discuss some details of his study of stimulus control. First, I will describe four experiments involved in his doctoral dissertation. All four experiments are about primary sensory generalization, that is, Experiments 1, 2, and 4 were conducted with intrasensory generalization, and Experiment 3 was with intersensory generalization.

Experiment 1 was most significant and was based on research by Guttman and Kalish (1956), in which generalization testing was done with a number of stimuli from the same stimulus dimension that had been used in single stimulus training. Unlike Guttman and Kalish, who presented a wide range of test stimuli at random, in Sato’s Experiment 1, stimuli were presented systematically, as in the Method of Limits in psychophysics: Stimuli were presented from short to long wavelengths or from long to short wavelengths along the color dimension. His experiment investigated the peak of the generalization gradient and whether stimulus categorization takes place. Forty naïve homing pigeons were assigned to eight groups with different experimental conditions. Stimuli for test were five or nine wavelengths within a range from 480 nm to 630 nm, and the training stimulus was 480 nm. Tests were repeated six times for each set of five or nine stimuli.

This experiment generated the following interesting results. First, when the test stimuli start from the training stimulus and then are moved away, the peak remains at the training stimulus as a gradually decreasing and roughly normal generalization gradient is obtained. On the other hand, when the test stimuli start away from the training stimulus and are moved toward it, the peak shifts from training stimulus toward the starting test stimulus. Second, about half of the cases showed a tendency of categorization bordering on 525 nm–540 nm and 600 nm–630 nm, corresponding to experimental results from Hamilton and Coleman (1933), Blough (1972), Wright and Cumming (1971), and Wright (1972), which showed wavelength borders at 540 nm and 600 nm–620 nm. Third, degrees of stimulus control and levels of categorization progressed with repetitions of test trials.

Experiment 2 of Sato's dissertation demonstrated that peak shifts after successive discrimination also arose in the domain of 525 nm–540 nm, which is the border of the categorization shown in Experiment 1. Experiment 3 tested stimulus control by the wavelength dimension after training with a vertical line on a color stimulus as S+ and a horizontal line on the same color stimulus as S-. Considerable intradimensional control was observed along the wavelength dimension, which was unrelated to the vertical–horizontal discrimination. Finally, Experiment 4 extended experiments by Hanson (1961) and by Thomas and Williams (1963), both of which used three stimuli in training. In Sato's case, peak shifts in generalization gradients after successive discrimination training with four stimuli (two S+ and two S-) had not been predicted by the results from those experiments using three stimuli; regular peak shifts were not obtained with four stimuli. Thus, the research on stimulus control by Dr. Sato shared its central concerns with the pioneers of his day.

In 1993, when Dr. Sato was 61 years old, he reviewed his own research on stimulus control in a paper entitled "Thirty years research on stimulus control: Stimulus control as a radical behaviorist views it," which appeared in a sociology bulletin of the graduate school of Keio University, "Studies in Sociology, Psychology, and Education." In the paper (Sato, 1993), he wrote, "The dream of mine from

some time ago became to explore and build up my own behavioral theory, that is to say, systematizing psychology as a science of behavior rather than accumulating experimental evidence about stimulus control. ... To establish further development of behavior analysis, it is required to do the systematic analysis of the whole scope of stimulus control theoretically and experimentally with a broad viewpoint." (pp. 89–90)

Then, what kind of systematic theory did he consider? He emphasized treating the discriminated operant as hierarchical. He first classified discriminated operants into two kinds, nontransferred operants and transferred operants. Nontransferred operants are established directly by reinforcement, and except for the case of primary generalization they are not controlled by stimuli which have not participated in the reinforcement relation. On the other hand, transferred operants are generalized operants controlled by discriminative stimuli without direct reinforcement histories. Typical representatives of nontransferred operants are simple discriminated operants and conditional discriminated operants; those of transferred operants are conceptual operants and higher-order discriminated operants.

Developing these ideas further, he related nontransferred identity matching to imitation and nontransferred arbitrary matching to rule-governed behavior. Similarly, he made extensions to transferred stimulus control involving generalized identity matching related to generalized imitation, and generalized arbitrary matching related to generalized rule-governed behavior. Finally, he noted correspondences between matching behavior and fundamental verbal behavior, such as identity matching in relation to echoic behavior and transcription, and arbitrary matching in relation to textual behavior, dictation taking, intraverbals, and tacting. In this way, he insisted that stimulus control was a general phenomenon extending from simple generalization and discrimination to complex social behavior such as imitation and language. Of course, he did not neglect to add that these theoretical frameworks can retain their validity and efficacy only with the support of experimental evidence.

Beyond his individual research, he contributed to and promoted organizational scholarly projects. One of two examples was the Japan-

United States Academic Seminar held with the aid of the Japan Society for the Promotion of Science and the United States National Science Foundation in July, 1992. Steven C. Hayes served as the representative of the United States while Masaya Sato served as that of Japan. American participants were Marc Branch, A. Charles Catania, Michael Dougher, Linda J. Hayes, Iver Iversen, Jay Moore, Howard Rachlin, and Hayne W. Reese, and Japanese participants were Toshio Asano, Takao Fushimi, Yuji Ito, Masako Jitsumori, Makiko Naka, Koichi Ono, Naoko Sugiyama, and Junichi Yamamoto. All participants engaged in energetic discussion following presentations that lasted from morning till night for six consecutive days in a Fujizakuraso hotel at the foot of Mt Fuji. A convivial party was held on the last evening, at which we enjoyed ourselves dressed in Japanese traditional garments (yukatas), and had much fun with pleasant conversations, entertainments, karaoke, ping-pong, and so on. The achievements of this conference were summarized in a publication edited by Hayes, Hayes, Sato, and Ono (1994).

Another example was the Third International Congress on Behaviorism and the Sciences of Behavior, held in Yokohama in October, 1996. Peter Harzem served as the chairperson while Dr. Sato served as the organizer. It was held for four consecutive days as if it were a "little ABA," providing opportunities of valuable exchanges between Japanese and foreign researchers through panel discussions, symposia, addresses, a poster session, and other events.

When I describe Masaya Sato as a person, it is crystal clear to me that he was an outstanding scholar. He grasped things and events from a comprehensive viewpoint, without neglecting details. He preferred flexible and creative ways of thinking, and therefore expected his students to think in unique or novel ways, as he did himself. However, I do not think that his wonderful ideas originated from simple guesses or mere imagination. Instead, they arose from the tremendous breadth of knowledge he had absorbed from papers, books, and personal communications. He often told us what he had found interesting in presentations at academic meetings, what new concepts had been proposed in recent publications, including details about those concepts. Thus, he earnestly provided us

with much new information. His own ideas arose from his enormous knowledge acquired in that way from a variety of sources. Furthermore, his logic in discussions was always clear-cut. That may be because he knew himself well; he knew what he knew, what he did not know, and what was for him ambiguous. These characteristics appeared in his frank attitudes toward what he was unfamiliar with, and perhaps they are what made Skinner's account of verbal behavior so special to him. By straightforwardly questioning his own ideas—"I don't know about it. What does it mean?"—he revised and reconstructed them. He was a scholar with brilliant intelligence and was dedicated to the quest for truth.

Everyone agrees that Sato's concerns were not limited to behavior analysis and psychology. He also had an appreciation for various other genres, including music, painting, literature, philosophy, and culture. Especially in music, he was a master of piano and had composed songs since his youth, some of which were recorded by professional singers. His melodies were lyrical, as typically demonstrated by *Kita guni no watashi wa shiawase* ("Happy am I in northern country"), which was sung by Yukiko Kashiwagi and released in 1970.

Later in his life, Sato released four CDs of melodies he had composed. Two were pop music and another two were nursery rhymes in which he had composed the melodies to lyrics written by others. One of the nursery rhyme CDs contains his "Twelve-month nursery rhyme suite," in which he composed music for lyrics for each month. The other is a set of rhyme selections, including *Ringo no obake* (Apple monster), which he composed as a setting to a lyric his father had written. The lyric portrays a scene in Dr. Sato's childhood days, when Masaya had finished his pleasant bath and his father Haruo had made fun of his rosy cheeks, saying "Here comes the apple monster!" It is an amusing song full of a father's warm affection for his son who deeply trusts him.

The Japanese ABA annual convention in 2004 was held in Teikyo University, hosted by Masaya Sato. That year marked B. F. Skinner's 100th birthday, so we composed a "100th birthday celebration song for Skinner," for which I wrote the lyrics and Sato composed the melody. We performed it in the convention

get-together party, though unfortunately the song was not released as a CD.

Besides CDs, he published two collections of his poems. One was a collection of short poems he had written throughout his life, entitled *Kanketsu shishu* (Sato, 2007; literally, “intermittent poems”). The other collection he wrote in later life, entitled *Kaba no baka* (Sato, 2008; “Baka the hippo”, *Baka* meaning something foolish or silly in Japanese) with a subtitle “Nonsense haiku collection.” The title is a palindrome that can be read in the same way in either direction if pronounced in *mora* units (the *mora* unit corresponds roughly to a syllable in English). His poems in the collection were of haiku style, consisting of three phrases of 5, 7, and 5 moras, and each ending with the five moras, *Kaba no baka*. *Kaba no baka* extracts essences of the actual world from various aspects of it, including human life, society, culture, academics, religion, and politics, each expressed in a poem.

Dr. Sato was also deeply concerned with the differences between Eastern and Western cultures. He recognized that, fundamentally, behavior analysis has something in common with Eastern viewpoints, especially with a Buddhist view of nature (e.g. Diller & Lattal, 2008). Buddhism is based on a concept called “En,” to view every existing event (phenomenon) in the world as not existing all alone, independent of others, but generated and changed and eliminated in close connection with others. In the Skinner memorial edition of the *Japanese Journal of Behavior Analysis*, Dr. Sato wrote a brief condolence message entitled “Skinner, the Buddhist without self-awareness: behavior contingency is En” (Sato, 1990).

Furthermore, Buddhism preaches that everything exists as it is in its natural form on the basis of En. This is described in a typical way by a master Buddhist, Dogen (1200–1253), in his statement that the only enlightened truth is *Gan nou bi choku*. This literally means that the eyes are placed in a horizontal line whereas the nose is in vertical direction, and he adds: *tada soredake da* (“a thing exists as it is”).

Where I teach, Komazawa University, was established by a religious group that is based upon Buddhist doctrines and recognizes Dogen as its founder. I found it of special interest that, in the latter half of Dr. Sato’s “Intermittent poems,” there are many four-line poems he wrote when he was about 68 years old, and every

poem ends with the line: *tada soredake da*. One of his poems closely resembles Dogen’s words:

Under a nose / there is / a mouth / as it is.

We deeply appreciate the blessings of his brilliant scholarship and the joyful memories we received from Dr. Sato as we shared his life, and shall long mourn his death. But, he might say,

After a life / there is / a death / as it is.

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